TABLE OF CONTENTS LIST FOR PART 90 VHF DEVICE

APPLICANT: KP ELECTRONIC SYSTEMS LTD.

FCC ID: H78KPBSR100

TEST REPORT:

EXHIBITS CONTAINING:

GENERAL_INFORMATION_REQUIRED FOR_TYPE_ACCEPTANCE

2.1033 (c)(1)(2) KP ELECTRONIC SYSTEMS LTD. will sell the FCC ID: H78KPBSR100 VHF transceiver in quantity, for use under FCC RULES PART 90.

2.1033 (c) TECHNICAL DESCRIPTION

2.1033 (3) User Manual See Exhibit 11.

2.1033 (4) Type of Emission: 11K0F2D For 12.5kHz

For 25kHz & 12kHz (9600 Baud Rate)
Bn = 2M + 2DK
M = 4,800 Bits per second
D = 700 Hz (Peak Deviation)
K = 1
Bn = 2(4.8K) + 2(700)(1) = 9.6K + 1.4K = 11.0k
ALLOWED AUTHORIZED BANDWIDTH = 12.5kHz.

For 12.5KHz
ALLOWED AUTHORIZED BANDWIDTH = 11.25kHz.

90.209(b)(5)

2.1033 (5) Frequency Range: 136-174 MHz

(6) Power Range and Controls:There are NO user Power controls.

(7) Maximum Output Power Rating:
12.0 Watts ,
into a 50 ohm resistive load.

(8) DC Voltages and Current into Final Amplifier:

DC POWER INPUT
FINAL AMPLIFIER ONLY
Vce = 12.0 Volts
Ic = 2.31 A
Pin = 27.7 Watts

(9) Tune-up procedure. The tune-up procedure is given in EXHIBIT 13.

2.1033 (10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 2A-2E. The block diagram is included as EXHIBIT 3.

(8) Instruction book. The instruction manual is included as EXHIBIT 11.

(10) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in EXHIBIT 5.

2.1033(c)(11) A photograph or drawing of the equipment identification label is shown in Exhibit 1.

2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in Exhibit 6-9.

2.1033(c)(13) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses FSK to modulate the transmitter.

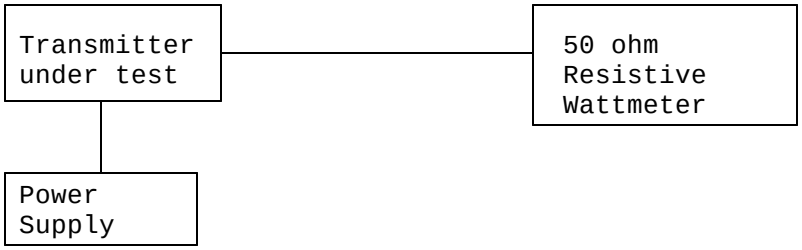
2.1033(c)(14) data required for 2.1046 to 2.1057 See Below

2.1046(a) RF_power_output.
RF power is measured by connecting a 50 ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage of 12.0 VDC, and the transmitter properly adjusted the RF output measures :

POWER MEASUREMENTS:
INPUT POWER - (12.0V)(2.31A) = 27.7 Watts

OUTPUT POWER: 12.0 Watts Efficiency = 43%

METHOD OF MEASURING RF POWER OUTPUT



2.1047(a) Voice Modulation_characteristics:
NOT APPLICABLE, F2 type of emission.

2.1049 Audio Low Pass Filter
This UUT does not have a low pass filter.

2.1049 Occupied_bandwidth:
90.210(c,) (Emission Mack C)
For transmitters that are not equipped with an audio low pass filter pursuant to S90.211(b), the power of any emission must be attenuated below the unmodulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency(fd in kHz) of more than 5kHz but not more Than10 kHz: At least 83 log(fd/5)dB; (2)ON any frequency removed from the center of the authorized bandwidth by a displacement frequency(fd in kHz) of more than 10kHz, but not more than 250% of the authorized bandwidth: At least 29 log(fd2/11)dB or 50dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least 43+10 log(Po)dB.

90.210(d) Emission Mask D - 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 (fd - 2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

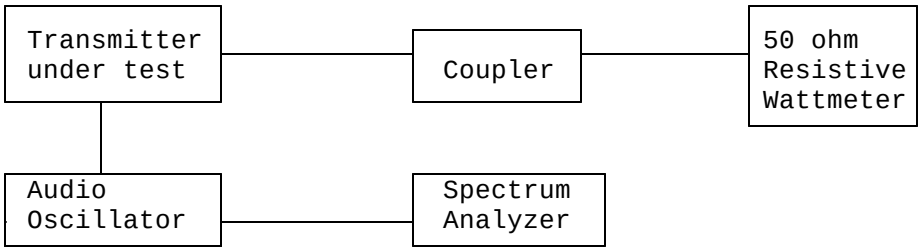
Data in the plots shows that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least 43+log(P)dB.

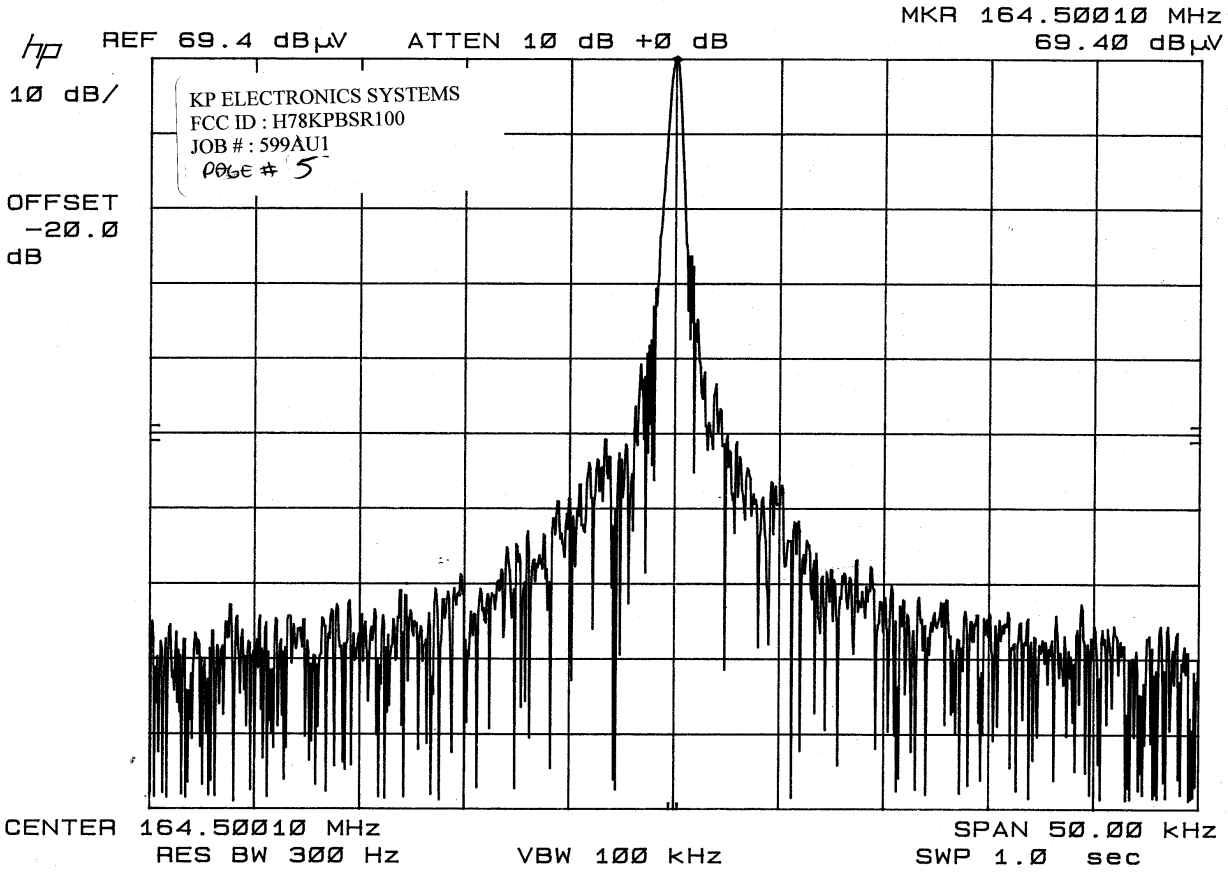
Radiotelephone transmitter with modulation limiter.

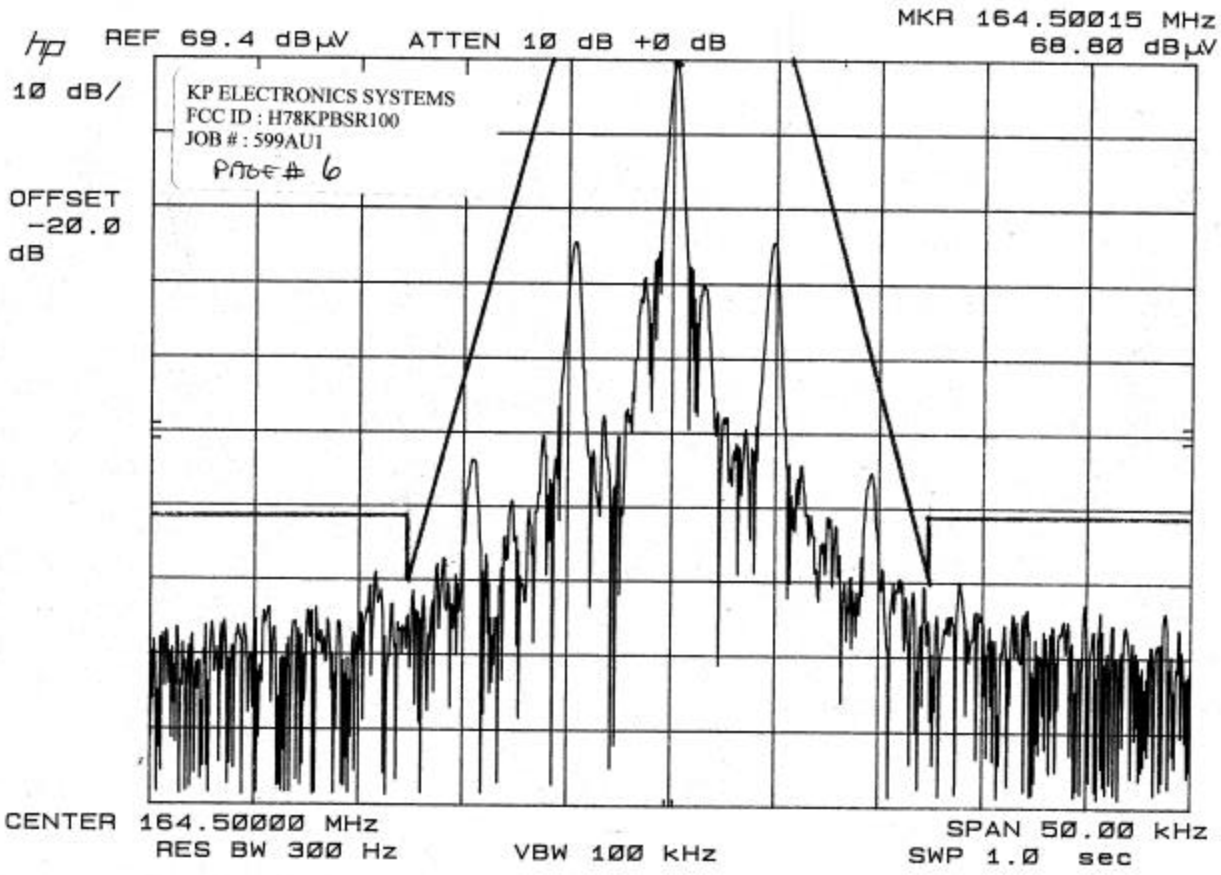
Test procedure: TIA/EIA-603 para 2.2.11 , with the exception that various tones were used.

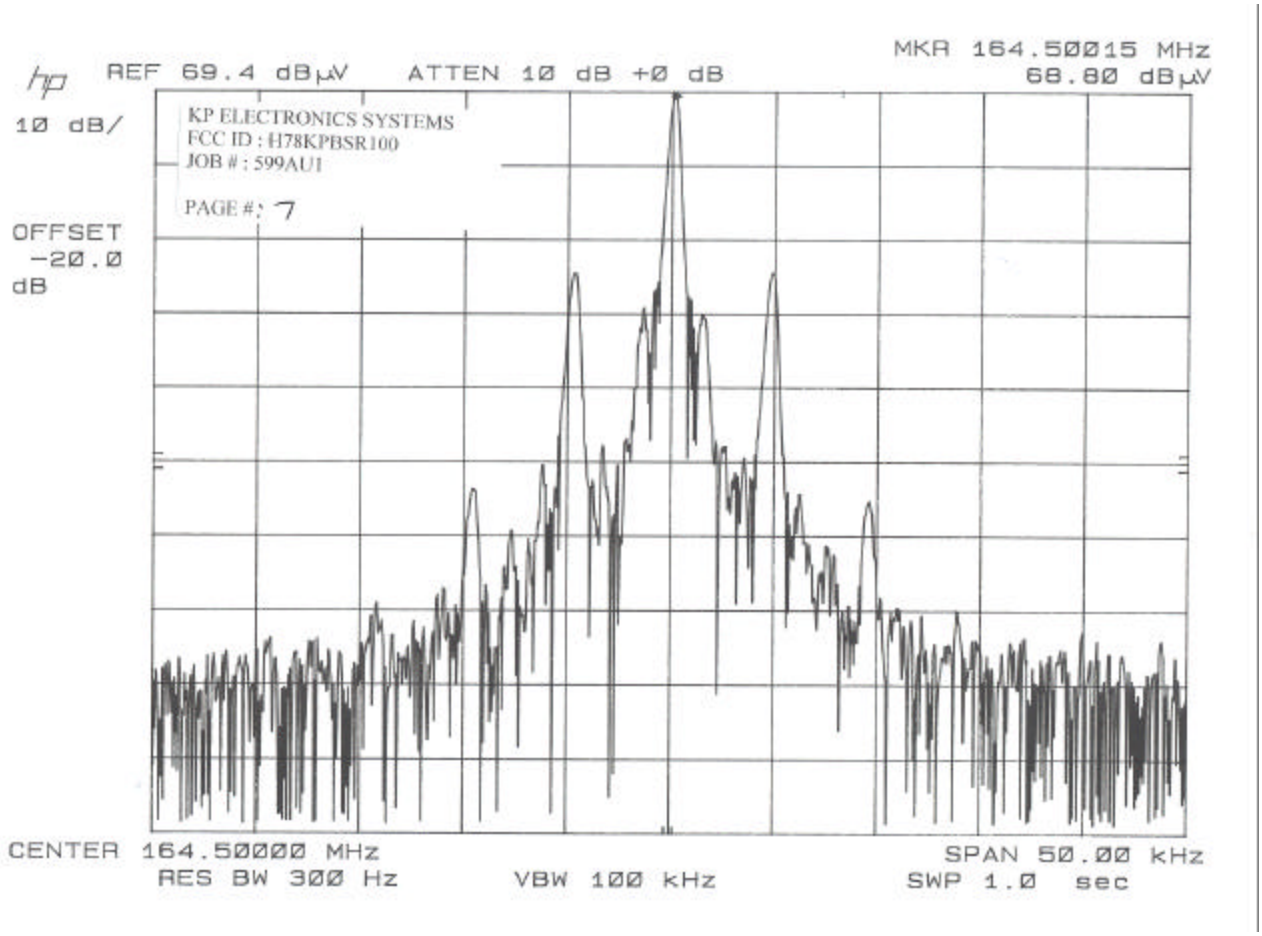
Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT




MKR 164.50010 MHz
REF 69.4 dBµV
ATTEN 10 dB +0 dB
69.40 dBµV
10 dB/
KP ELECTRONICS SYSTEMS
FCC ID : H78KPBSR100
JOB # : 599AU1
PAGE # 5
OFFSET
-20.0
dB
CENTER 164.50010 MHz
SPAN 50.00 kHz
RES BW 300 Hz
VBW 100 kHz
SWP 1.0 sec


MKR 164.50015 MHz
68.80 dBµV
REF 69.4 dBµV
ATTEN 10 dB +0 dB
10 dB/
KP ELECTRONICS SYSTEMS
FCC ID : H78KPBSR100
JOB # : 599AU1
Page # 6
OFFSET
-20.0
dB
CENTER 164.50000 MHz
RES BW 300 Hz
VBW 100 kHz
SPAN 50.00 kHz
SWP 1.0 sec


MKR 164.50015 MHz
68.80 dBµV
REF 69.4 dBµV
ATTEN 10 dB +0 dB
10 dB/
KP ELECTRONICS SYSTEMS
FCC ID : H78KPBSR100
JOB # : 599AU1
PAGE #: 7
OFFSET
-20.0
dB
CENTER 164.50000 MHz
RES BW 300 Hz
VBW 100 kHz
SPAN 50.00 kHz
SWP 1.0 sec

2.1051 Spurious emissions at antenna terminals(conducted):

2.1052 Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

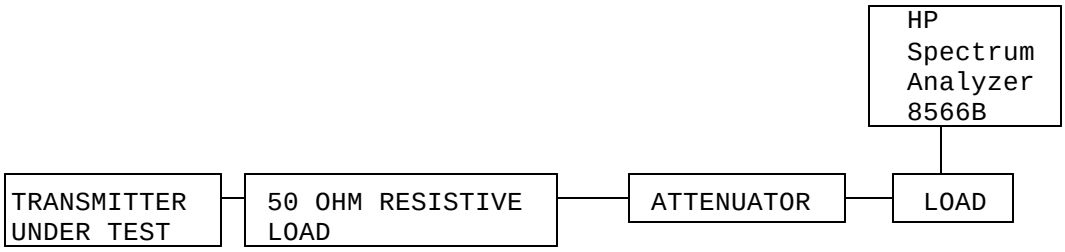
Method of Measuring Conducted Spurious Emissions (conducted)

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

For 12.5KHz 50 + 10log(12.0) = 50 - 10.8 = 60.8dB

EMISSION FREQUENCY MHz	DB BELOW CARRIER
164.50	00.0
329.00	65.5
493.50	80.4
658.00	83.7
822.50	96.6
987.00	95.2
1151.50	----

Method of Measuring Conducted Spurious Emissions



METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD without any exceptions. An audio generator was connected to the UUT through a dummy microphone circuit and the output of the transmitter connected to a standard load and from the standard load through a pre-selector filter of the spectrum analyzer. The spectrum was scanned from 400KHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

2.1053 Field strength of spurious emissions:

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be 50 +10log(Po) dB below the mean power output of the transmitter.

50 + 10log(12.0) = 60.8 dB

MEAN POWER OUTPUT = 138.3 dB
- 60.8 dB

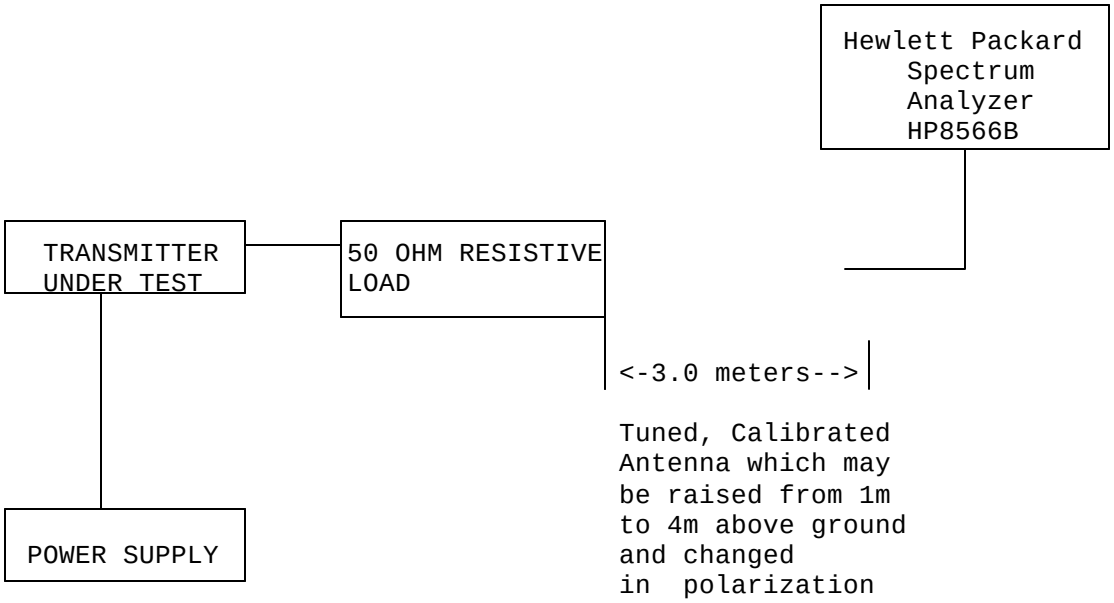
MAX LIMIT = 77.5 dB

TEST DATA:

Emission Frequency MHz	**Attn. dBc**	**Margin dB**
164.50	**0.00**	**0.00**
329.00	**111.75**	**50.95**
493.50	**99.47**	**38.67**
658.00	**105.75**	**44.95**

METHOD OF MEASUREMENT: The tabulated Data shows the results of the radiated field strength emissions and attenuation calculated per TIA/EIA 603. The spectrum was scanned from 30 MHz to at least the Tenth harmonic of the fundamental. This test was conducted per TIA/EIA 603. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 N.W. STATE ROAD 45, NEWBERRY, FLA. 32669.

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.

2.1055 Frequency stability:
90.213(a)(1)

Temperature and voltage tests were performed to verify that the frequency remains within the 2.5 ppm specification limit for 12.5KHz channel bandwidth spacing. The test was conducted as follows:
The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50 degrees C.

Readings were also taken at 85% and 115% of the supply voltage.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 164.500 000 MHz

TEMPERATURE_°C	FREQUENCY_MHz	PPM
REFERENCE	164.500 000	0.00
-30	164.500 040	0.24
-20	164.499 862	-0.84
-10	164.499 808	-1.17
0	164.499 865	-0.82
+10	164.499 957	0.26
+20	164.500 036	0.22
+30	164.500 087	0.53
+40	164.500 095	0.58
+50	164.500 028	0.17
-15% 10.2VDC End-Point VDC	164.500 070	0.43
+15% 13.8VDC End-Point VDC	164.500 066	0.40

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -1.17 ppm.

2.1055(a)(1) Frequency stability:
90.214 Transient Frequency Behavior

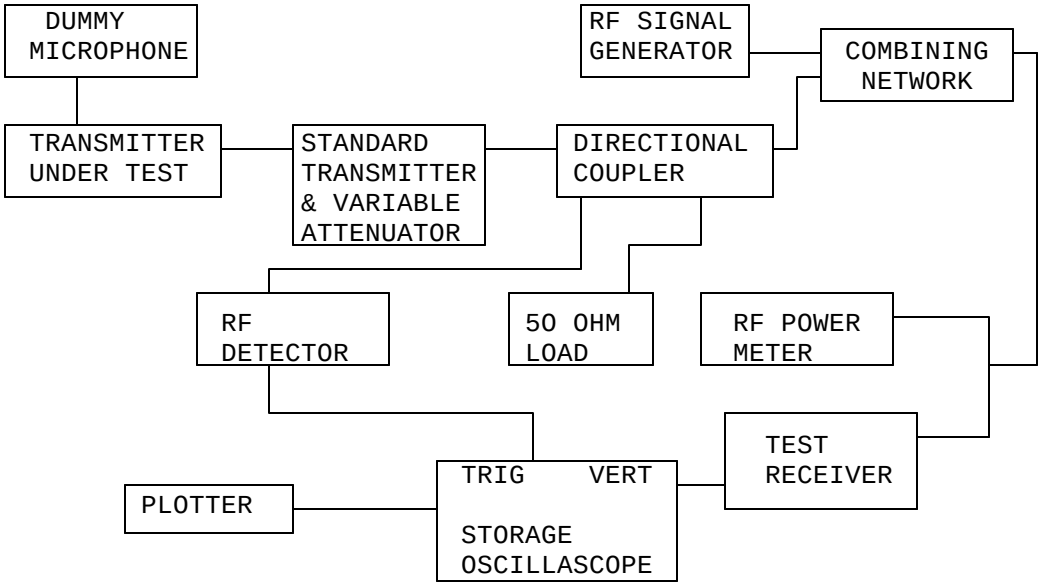
REQUIREMENTS: In the 150-174MHz frequency band, transient frequencies must be within the maximum frequency difference limits during the time interval indicated below for 12.5kHz Channels:

Time Interval	Maximum Frequency	Portable Radios 150-174Mhz
t1	+12.5kHz	5.0ms
t2	+6.25kHz	20.0ms
t3,t4	+12.5kHz	5.0mS

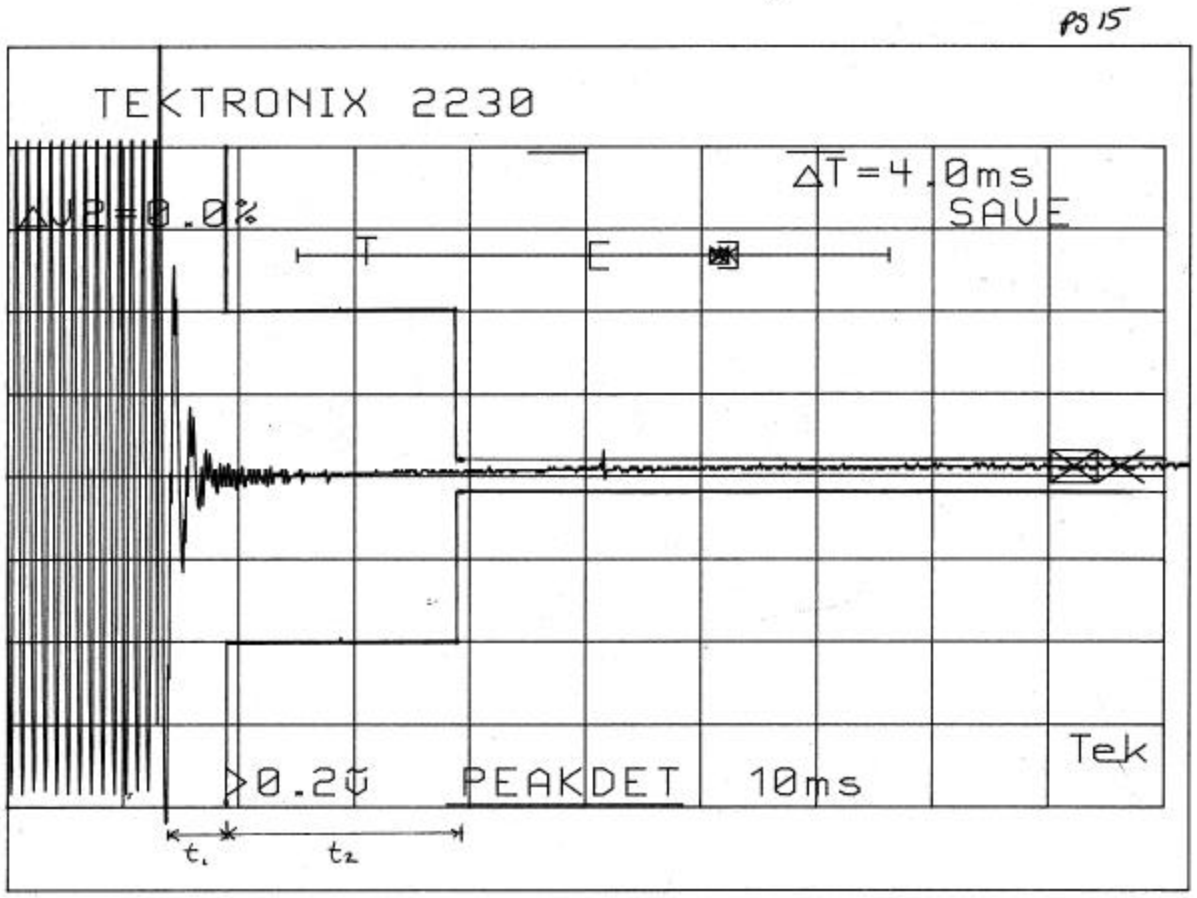
TEST PROCEEDURE: TIA/EIA TS603 PARA 2.2.19, the levels were set as follows;

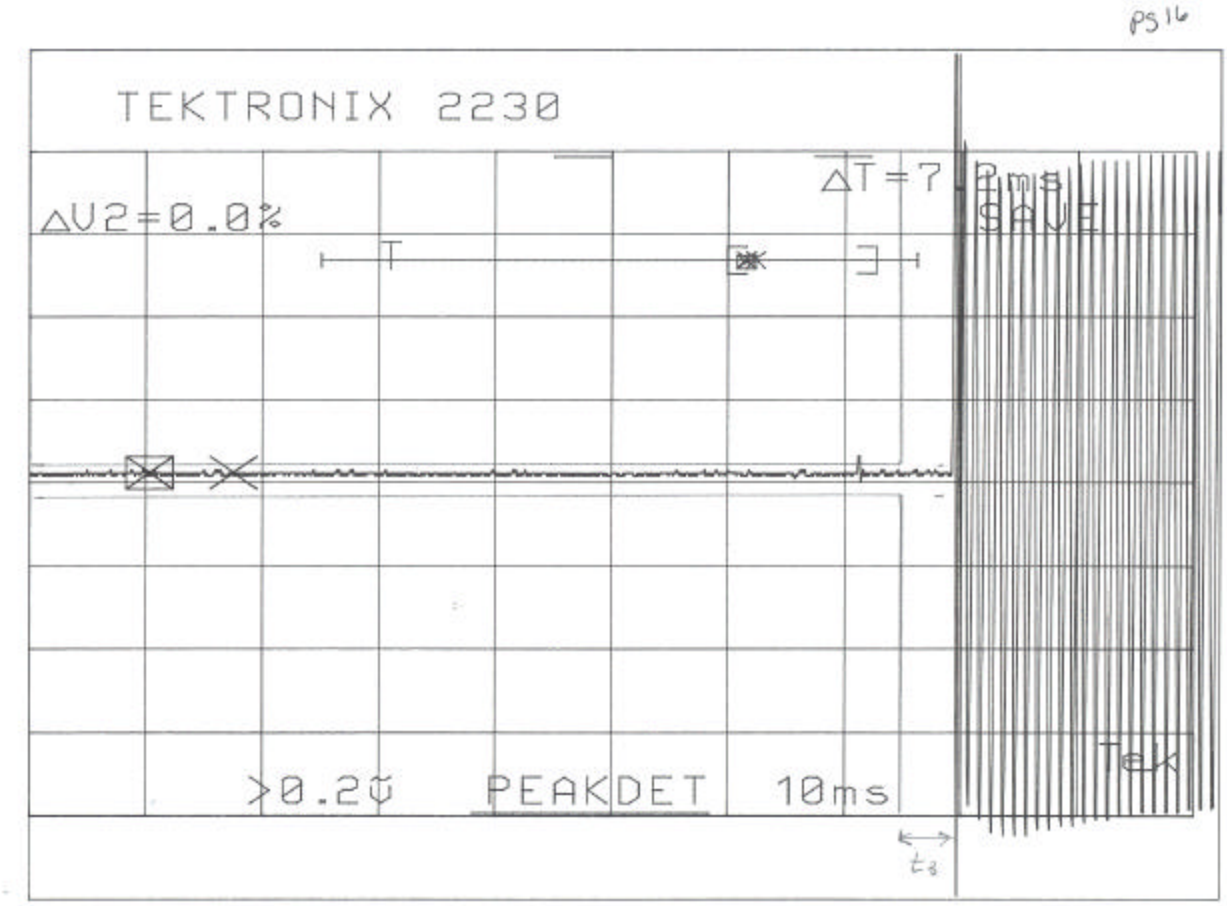
1. Using the variable attenuator the transmitter level was set to 40dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the Transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30dB.
4. With the levels set as above the transient frequency behavior was observed and recorded.

2.1055 Frequency stability:
90.214 Transient Frequency Behavior
(Continued)



In the 150-174 MHz band, fixed and base stations with a 12.5 kHz Channel bandwidth must have a frequency stability of 2.5 ppm.


PG 15
TEKTRONIX 2230
ΔV2=0.0%
ΔT=4.0ms
SAVE
T
E
Tek
>0.2Ψ
PEAKDET
10ms
t1
t2

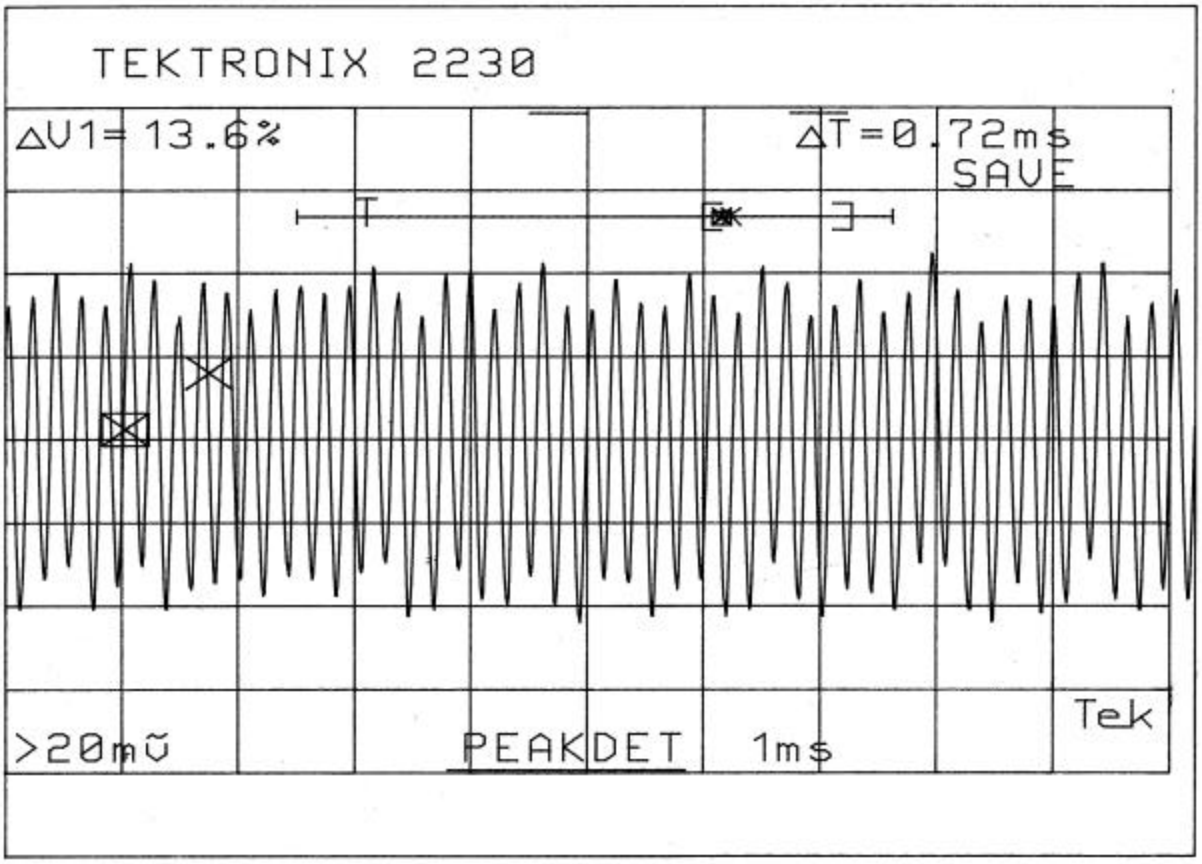

PS16
TEKTRONIX 2230
ΔV2=0.0%
ΔT=7.8ms
SAVE
>0.2Ψ
PEAKDET
10ms
Tek

90.203 Spectrum Efficiency

Applications for part 90 certification of transmitters designed to operate on frequencies in the 150-175 MHz and/or 421-512 MHz bands, received on or after February 14, 1997, must include a ccertification that the equipment meets a spectrum efficiency standard of one voice channel per 12.5 KHz of channel bandwidth. Additionally, if the equipment is capable of transmitting data, has a transmitter output power greater than 500 mW, and has a channel bandwidth of more than 6.25 kHz, the equipment must be capable of supporting a minimum data rate of 4800 bits per second per 6.25 kHz of channel bandwidth.

The EUT was operated at 9600 baud rate (4800 bits/second). A plot of the data is shown on the next page. The data shows the device complies with the requirements for this Part.

pg 18



Measurement Procedures for Type Acceptance:

Measurement techniques have been in accordance with TIA/EIA STD 603-1992.

TEST EQUIPMENT LIST

1. Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/ preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter HP 8565OA, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372
2. Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3. Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171
4. Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
5. Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409
6. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319
7. 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
8. Horn 40-60GHz: ATM Part #19-443-6R
9. Line Impedance Stabilization Network: Electro-Metrics Model EM-7820, w/NEMA Adapter S/N 2682
10. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11. Frequency Counter: HP Model 5385A, S/N 3242A07460
12. Peak Power Meter: HP Model 8900C, S/N 2131A00545
13. Open Area Test Site #1-3meters
14. Signal Generator: HP 8640B, S/N 2308A21464
15. Signal Generator: HP 8614A, S/N 2015A07428
16. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N 9706-1211
17. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153
18. AC Voltmeter: HP Model 400FL, S/N 2213A14499
19. Digital Multimeter: Fluke Model 8012A, S/N 4810047
20. Digital Multimeter: Fluke Model 77, S/N 43850817
21. Oscilloscope: Tektronix Model 2230, S/N 300572